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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/588,481

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Soon Ho Ahn

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EXAMINER

WEINER, LAURA S

ART UNIT

PAPER NUMBER

1726

NOTIFICATION DATE

DELIVERY MODE

04/20/2011

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

usptopatentmail@cantorcolburn.com

Office Action Summary	Application No.	Applicant(s)	
	10/588,481	AHN ET AL.	
	Examiner	Art Unit	
	/Laura S. Weiner/	1726	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 March 2011.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 10-14, 16-22 and 24-29 is/are pending in the application.
- 4a) Of the above claim(s) 26-29 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 10-14, 16-22, 24 and 25 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>3-24-11</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restrictions

1. Applicant's election without traverse of a first additive being a biphenyl and a second additive being cyclohexylbenzene in the reply filed on 2-11-2010 is acknowledged.
2. Newly submitted claims 26-29 directed to an invention that is independent or distinct from the invention originally claimed for the following reasons: Claim 26 claims an electrolyte solvent where the second additive cannot be a cyclohexylbenzene. Claim 27 which depend from claim 26 claims that the first additive can be a biphenyl but claim 10 has been amended so that the first additive can no longer be a biphenyl. Claim 29 which depend from claim 28 which depends from claim 26 claims that the first additive can be a biphenyl but claim 10 has been amended so that the first additive can no longer be a biphenyl.

Since applicant has received an action on the merits for the originally presented invention, this invention has been constructively elected by original presentation for prosecution on the merits. Accordingly, claims 26-29 are withdrawn from consideration as being directed to a non-elected invention. See 37 CFR 1.142(b) and MPEP § 821.03.

Response to Arguments

3. Applicant's arguments with respect to claims 10-14, 16-22, 24-25 have been considered but are moot in view of the new ground(s) of rejection.

The rejection of claims 10-14, 16-22, 24-25 under 35 U.S.C. 102(b) as being anticipated by Hinohara et al. (JP 2003-257479, translation) and the rejection of claims 10-14, 16-17, 18-22, 24-25 under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Hinohara et al. (JP 2003-257479, translation) has been withdrawn because applicants have narrowed the choices for the first additive and the second additive respectively and claim 10 does not allow for a first additive to be specifically a biphenyl compound and a second additive to be specifically a cyclohexylbenzene compound or a fluorobiphenyl compound.

Since applicant has removed the choice of broadly a biphenyl compound for one additive and removed the choice of broadly a fluorobiphenyl compound or a cyclohexylbenzene compound for a second additive, a new additive combination was searched. The new additive combination searched was a first additive comprising specifically thiophene paired up with a second additive specifically cyclohexylbenzene.

Claim Rejections - 35 USC § 112

4. Claims 10-14, 16-22, 24-25 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 10 is rejected because the first additive and the second additives are now cited as compound names instead of claimed as compounds. Claim 1 should claim the compound or the compound name and the compound so the claim is consistent with the dependent claims.

Claims 16-17, 24-25 are rejected because the claims claim the first and second additives as compounds and not as compound names as claimed in claim 10 from which the claims depend from. The claims should claim the compound name and compound.

Claim Rejections - 35 USC § 102

Claim Rejections - 35 USC § 103

5. Claims 10, 12- 14, 16-18, 20-22, 24-25 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Kozuki et al. (JP 2003-22838, translation of specification and claims).

Kozuki et al. teaches in claim 1, a nonaqueous electrolyte secondary battery comprising a cathode, an anode, a separator and a nonaqueous electrolyte that dissolved electrolyte salt in a nonaqueous solvent and comprises an aromatic additive. Kozuki et al. teaches in claim 2, that the aromatic additive is at least one chosen from phenylcyclohexane [cyclohexylbenzene], biphenyl, a thiophene, diphenyl ether, terphenyl, a franc and a group that consists of these derivatives.

Since Kozuki et al. teaches the same first additive compound a biphenyl, a furan or a thiophene and the same second additive, phenylcyclohexane [cyclohexylbenzene]

Art Unit: 1726

then inherently the same first additive compound having an oxidation initiation potential of more than 4.2V or 4.2-5.3 V or 4.5-4.9 V and a second additive compound with an oxidation initiation voltage of more than 4.2 V or 4.2-5.3 V or 4.5-4.9 V which is higher in oxidation initiation potential than the first additive, and deposits oxidative products or forms a polymer film in oxidation must also be obtained.

In addition, the presently claimed property of first additive compound having an oxidation initiation potential of more than 4.2V and a second additive compound with an oxidation initiation voltage of more than 4.2 V which is higher in oxidation initiation potential than the first additive, and deposits oxidative products or forms a polymer film in oxidation would have obviously have been present once the Kozuki et al. product is provided. *In re Best*, 195 USPQ 433 (CCPA 1977).

6. Claims 10, 12- 14, 16-18, 20-22, 24-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kozuki et al. (JP 2003-22838, translation of specification and claims).

Kozuki et al. teaches in claim 1, a nonaqueous electrolyte secondary battery comprising a cathode, an anode, a separator and a nonaqueous electrolyte that dissolved electrolyte salt in a nonaqueous solvent and comprises an aromatic additive. Kozuki et al. teaches in claim 2, that the aromatic additive is at least one chosen from phenylcyclohexane [cyclohexylbenzene], biphenyl, a thiophene, diphenyl ether, terphenyl, a franc and a group that consists of these derivatives.

Since Kozuki et al. teaches the same first additive compound a biphenyl, a furan or a thiophene and the same second additive, phenylcyclohexane [cyclohexylbenzene] then inherently the same first additive compound having an oxidation initiation potential of more than 4.2V or 4.2-5.3 V or 4.5-4.9 V and a second additive compound with an oxidation initiation voltage of more than 4.2 V or 4.2-5.3 V or 4.5-4.9 V which is higher in oxidation initiation potential than the first additive, and deposits oxidative products or forms a polymer film in oxidation must also be obtained.

In addition, the presently claimed property of first additive compound having an oxidation initiation potential of more than 4.2V and a second additive compound with an oxidation initiation voltage of more than 4.2 V which is higher in oxidation initiation potential than the first additive, and deposits oxidative products or forms a polymer film in oxidation would have obviously have been present once the Kozuki et al. product is provided. *In re Best, 195 USPQ 433 (CCPA 1977).*

Kozuki et al. discloses the claimed invention except for specifically teaching that the first additive is specifically thiophene and the second additive is specifically phenylcyclohexane [cyclohexylbenzene].

It would have been obvious to one having ordinary skill in the art at the time the invention was made to use both additives, thiophene and phenylcyclohexane [cyclohexylbenzene] in the electrolyte taught by Kozuki because Kozuki teaches that more than one additive can be used and because it is prima facie obvious to combine

two compositions each of which is taught by prior art to be useful for the same purpose in order to form a third composition that is to be used for the very same purpose. See *In re Kerkhoven*, 205 USPQ 1069; *In re Susi*, 169 USPQ 423.

7. Claims 10-14, 16-22, 24-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hinohara et al. (JP 2003-257479, translation) in view of Kozuki et al. (JP 2003-22838, translation of specification and claims).

Hinohara et al. teaches on page 4 of the translation a battery comprising an electrolyte comprising 0.1-20 wt% of a fluorine atom substituted aromatic compound and 0.1-3 wt% of an aromatic hydrocarbon compound. Hinohara et al. teaches on pages 5-6 of the translation that the fluorine atom substituted aromatic compound can be a fluorine atom substituted benzene, a fluorine atom substituted biphenyl, such as 2-fluorobiphenyl, etc. Hinohara et al. teaches on page 6 of the translation, that the aromatic hydrocarbon compound can be cyclohexylbenzene [*second additive*], biphenyl [*first additive*], etc. Hinohara et al. teaches on page 14 and table 1, that the electrolyte comprises ethylene carbonate, methyl ethyl carbonate, LiPF₆ and 2-fluorobiphenyl (FBP) and biphenyl (BP) or cyclohexylbenzene (CHB). Hinohara et al. teaches on page 15, that the battery comprises an anode comprising graphite, a separator and a cathode comprising LiCoO₂.

Hinohara et al. discloses the claimed invention except for specifically teaching that the first additive is specifically thiophene and the second additive is specifically phenylcyclohexane [cyclohexylbenzene].

Kozuki et al. teaches in claim 1, a nonaqueous electrolyte secondary battery comprising a cathode, an anode, a separator and a nonaqueous electrolyte that dissolved electrolyte salt in a nonaqueous solvent and comprises an aromatic additive. Kozuki et al. teaches in claim 2, that the aromatic additive is at least one chosen from phenylcyclohexane [cyclohexylbenzene], biphenyl, a thiophene, diphenyl ether, terphenyl, a franc and a group that consists of these derivatives.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to use thiophene instead of biphenyl as the first additive with cyclohexylbenzene as the second additive because Kozuki et al. teaches that both these additives can be used in the electrolyte as explained above and one would expect therefore that these additive materials would function in a similar way and give similar results.

Since Hinohara et al. in view of Kozuki et al. teaches the same first additive compound a thiophene and the same second additive, a phenylcyclohexane [cyclohexylbenzene] then inherently the same first additive compound having an oxidation initiation potential of more than 4.2V or 4.2-5.3 V or 4.5-4.9 V and a second additive compound with an oxidation initiation voltage of more than 4.2 V or 4.2-5.3 V or 4.5-4.9 V which is higher in oxidation initiation potential than the first additive, and deposits oxidative products or forms a polymer film in oxidation must also be obtained.

In addition, the presently claimed property of first additive compound having an oxidation initiation potential of more than 4.2V and a second additive compound with an oxidation initiation voltage of more than 4.2 V which is higher in oxidation initiation

potential than the first additive, and deposits oxidative products or forms a polymer film in oxidation would have obviously have been present once the Hinohara et al. in view of Kozuki et al. product is provided. *In re Best*, 195 USPQ 433 (CCPA 1977).

8. Claims 10-14, 16-22, 24-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Watanabe et al. (WO 02/31904/US 2003/0118912).

Watanabe et al. teaches on page 2, [0016] and [0018], an electrolyte comprising 0.01-1.0 wt% of a biphenyl [*first additive*] and 1.0-5.0 wt% of a cyclohexylbenzene [*second additive*]. Watanabe et al. teaches on page 2, [0022], that the positive electrode comprise a material containing a lithium-containing metal oxide and the negative electrode comprise graphite. Watanabe et al. teaches on pages 4-5, Examples 1 and 2, a battery comprising a positive electrode comprising LiCoO₂, a negative electrode comprising graphite, a separator and an electrolyte solution comprising 1 mol/liter of LiPF₆ in a mixed solvent comprising EC and EMC and 0.2 wt% of biphenyl and 2 wt% of cyclohexylbenzene. Watanabe et al. teaches on page 4, [0045], that the separator is an insulating microporous thin film.

Watanabe et al. discloses the claimed invention except for specifically teaching that the first additive is specifically thiophene and the second additive is specifically phenylcyclohexane [cyclohexylbenzene].

Kozuki et al. teaches in claim 1, a nonaqueous electrolyte secondary battery comprising a cathode, an anode, a separator and a nonaqueous electrolyte that dissolved electrolyte salt in a nonaqueous solvent and comprises an aromatic additive.

Art Unit: 1726

Kozuki et al. teaches in claim 2, that the aromatic additive is at least one chosen from phenylcyclohexane [cyclohexylbenzene], biphenyl, a thiophene, diphenyl ether, terphenyl, a franc and a group that consists of these derivatives.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to use thiophene instead of biphenyl as the first additive with cyclohexylbenzene as the second additive because Kozuki et al. teaches that both these additives can be used in the electrolyte as explained above and one would expect therefore that these additive materials would function in a similar way and give similar results.

Since Watanabe et al. in view of Kozuki et al. teaches the same first additive compound a thiophene and the same second additive, a phenylcyclohexane [cyclohexylbenzene] then inherently the same first additive compound having an oxidation initiation potential of more than 4.2V or 4.2-5.3 V or 4.5-4.9 V and a second additive compound with an oxidation initiation voltage of more than 4.2 V or 4.2-5.3 V or 4.5-4.9 V which is higher in oxidation initiation potential than the first additive, and deposits oxidative products or forms a polymer film in oxidation must also be obtained.

In addition, the presently claimed property of first additive compound having an oxidation initiation potential of more than 4.2V and a second additive compound with an oxidation initiation voltage of more than 4.2 V which is higher in oxidation initiation

Art Unit: 1726

potential than the first additive, and deposits oxidative products or forms a polymer film in oxidation would have obviously have been present once the Watanabe et al. in view of Kozuki et al. product is provided. *In re Best*, 195 USPQ 433 (CCPA 1977).

Conclusion

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to /Laura S. Weiner/ whose telephone number is 571-272-1294. The examiner can normally be reached on M-H (6:30-5:00).

Art Unit: 1726

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Laura S Weiner/
Primary Examiner
Art Unit 1726

April 12, 2011